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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/666,420	09/20/2000	Hoanh Nang Pham	06052 USA	5993

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AIR PRODUCTS AND CHEMICALS, INC.  
PATENT DEPARTMENT  
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ALLENTOWN, PA 181951501

EXAMINER

MELICK, ANDREW G

ART UNIT	PAPER NUMBER
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1764

6

DATE MAILED: 06/28/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/666,420

Applicant(s)

PHAM ET AL

Examiner

Andrew G. Melick

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) 25-32 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application)  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_

## DETAILED ACTION

### *Election/Restrictions*

- ✓ 1. Applicant's election without traverse of Group I (claims 1-24) in Paper No. 5 is acknowledged.
- ✓ 2. Claims 25-32 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 5.

### *Specification*

- ✓ 3. The disclosure is objected to because of the following informalities:  
On page 11, line 19 and on page 12 line 4, the reference character "26" is inconsistently labeled as "reformer catalyst tubes" and "tube-in-tube devices".  
Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:  
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
5. Claims 11-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Art Unit: 1764

In claim 9, it is not clearly stated that the first and second convection chambers are related to the at least one convection chamber in claim 2. The claim should state: wherein the at least one convection chamber comprises a first convection chamber and a second convection chamber, and at least one duct connects the first convection chamber with the second convection chamber.

In claims 11-15 the language recites a method limitation and therefore renders the claim vague and indefinite. The "mixed-feed", the first and second portions of mixed-feed, the flue gas, the product synthesis gas, and flow directions relative to one another are not part of the apparatus.

Claim 14 recites the limitation "tube-in-tube" in line 2. There is insufficient antecedent basis for this limitation in the claim since according to claim 12, the first portion of feed flows through the first reaction chamber and in claim 6 the tube-in-tube device is the second reaction chamber only.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

Art Unit: 1764

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
8. Claims 1, 2, 4-10, 16, 18-20, 22, 23, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruck (4,440,727) in view of Stahl (6,136,279).

Referring to claims 1 and 2, Bruck discloses an apparatus comprising a vessel (1) with a partition wall dividing the vessel into a plurality of chambers, including a combustion chamber (2) with a first and a second end opposite the first end, and a convection chamber (3) with a first and a second end opposite the first end; a burner (9) disposed in the combustion chamber adapted to combust fuel and generate flue gas, communication means between combustion chamber and convection chamber whereby a portion of flue gas flows from the combustion chamber to the convection chamber at a first location adjacent the first end of the convection chamber (Figure 2), transfer means whereby a portion of the flue gas flows to a second location in the convective chamber adjacent the second end of the convection chamber, a first reaction chamber (8) with a substantial portion disposed in the combustion chamber.

Bruck discloses a second chamber (3) with heat exchange tubes disposed in the chamber for convective heat transfer, however Bruck does not disclose this second chamber as a reaction chamber.

Stahl discloses reformer reaction tubes (8) in a convective reaction chamber. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the reformer reaction tubes of Stahl in the second (convective) chamber of Bruck since this would increase reactor throughput.

Art Unit: 1764

Referring to claims 4 and 5, Bruck and Stahl disclose vertical reaction chambers.

Referring to claims 6 and 7, Stahl discloses a reaction chamber that is a tube-in-tube

Referring to claim 8 and 22, Bruck discloses an assembly with multiple units.

Referring to claims 9, 10, 23, and 24 Bruck discloses ducts connecting first and second convection chambers and a convection pass (5) in communication with the ducts.

Referring to claim 16, Stahl discloses the reaction tubes as reformer tubes (8).

Referring to claim 18, Bruck discloses an assembly with multiple units.

Referring to claims 19 and 20, Bruck discloses ducts connecting first and second convection chambers and a convection pass (5) in communication with the ducts.

9. Claim 3, 17, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruck and Stahl as applied to claims 1, 2, 4-10, 16, 18-20, 22, 23, and 24 above, and further in view of Tsai (4,792,436).

Bruck and Stahl disclose all the limitations as claimed except for a communication means between the first reaction chamber and the second reaction chamber.

Tsai discloses communication means (16) between a first reaction chamber (11a) and a second reaction chamber (11b). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the communication means between the chambers disclosed by Tsai in the apparatus of Bruck to utilize the sensible heat from the flue gas produced by the furnace for heating the feed to reaction temperature.

10. Claims 11, 12, 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruck and Stahl as applied to claims 1, 2, 4-10, 16, 18-20, 22, 23, and 24 above, and further in view of Arisaki et al. (5,181,990).

Bruck and Stahl disclose all the limitations as claimed except for the feed flowing co-currently with the flue gas in the combustion chamber and feed flowing counter-currently with flue gas in the convection chamber.

Arisaki discloses feed entering the bottom of a furnace chamber flowing co-currently with the flue gas (Figure 1). Arisaki also discloses feed flowing counter-currently with the flue gas in the convection chamber (6). It would have been obvious to one having ordinary skill in the art at the time the invention was made to flow feed co-currently with flue gas in the combustion chamber of Bruck since this raises the temperature of the fluid at the inlet thereby shortening the retention time of hydrocarbons inside the furnace as taught by Arisaki.

11. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruck, Stahl, and Arisaki as applied to claims 1, 2, 4-13, 16, 18-20, 23, and 24 above, and further in view of Makabe et al. (5,226,928).

Bruck, Stahl, and Arisaki disclose all the limitations as claimed except for the feed flowing in an annular portion of a tube-in-tube reactor chamber and a product gas flowing in an inner tubular portion of the tube-in-tube reactor chamber counter-currently to the feed.

Makabe discloses feed flowing in an annular portion (Figures 1 and 2, O) of a tube-in-tube reactor chamber and a product gas flowing in an inner portion (Figures 1 and 2, I) of the tube-in-tube reactor chamber counter-currently. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use this flow arrangement with the apparatus of Bruck since this improves heat efficiency as taught by Makabe.

### *Conclusion*

Art Unit: 1764

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew G. Melick whose telephone number is 703-305-5308. The examiner can normally be reached on 8AM - 5PM, M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marian C Knode can be reached on 703-308-4311. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Andrew G. Melick  
June 26, 2002

*Hien Tran*  
**HIEN TRAN**  
**PRIMARY EXAMINER**